# OPTICAL AIMING DEVICE

## BACKGROUND

The subject invention relates to the aiming of projectiles that are launched at a visible target object from bows, crossbows, firearms and pellet guns.

For the projectile to land where desired, the launching device must be aligned in such a manner that the trajectory of the projectile is taken into account. A common way of aligning the launching device is to have alignment references attached to the launching device. These alignment references are referred to as an aiming device.

The aiming device provides a line-of-sight reference that is a straight line in space. This line-of sight reference is aligned to the up and down plane of the trajectory of the projectile and to some point on that trajectory, which is a known distance from the projectile launcher. Thus, when the line-of-sight reference of the aiming device is aligned with a target object at that known distance, the projectile will land precisely on the target object. However, because of the trajectory of the projectile, if the distance is not the same known distance that the line-of-sight reference is aligned to and the line-of-sight reference is aligned with the target object, the projectile will land above or below the target object.

To overcome this situation, some aiming devices are made to be adjustable in a manner that allows the line-of-sight reference to be moved up and down within the

plane of the trajectory of the projectile. Examples of aiming devices used on bows, to adjust the line-of-sight reference for varying distances are; Slates-U.S. patent 6,430,822, Gibbs-U.S. patent 5,384,966, and Heck-U.S. patent 4,020,560. Examples of adjustable aiming devices used on guns, and crossbows to adjust the line-of-sight reference for varying distances are; Barnett-U.S. patent 6,073,351, Wilhide-U.S. patent 4,660,289, and Bass-U.S. patent 4,317,304.

Aiming devices help the eye to be properly aligned with the line-of-sight reference. The most common way of accomplishing proper alignment of the eye with the line-of-sight reference is to have the aiming device consist of two points separated by distance such that when the two points are visually aligned, the eye is aligned with the line-of-sight reference. The telescopic sights use optics to superimpose a line-of-sight reference, such as crosshair, on an image of the target object and require less precise alignment with the eye.

A common method of creating an adjustable line-of-sight reference on bows is to use device **40**, shown in **FIG. 1A**, similar to the one described by Chipman in U.S. patent 5,697,357, immovably attached to the bowstring. Along with a device that has a movable aiming point, like the ones described by Slates in U.S. patent 6,430,822, Gibbs in U.S. patent 5,384,966 or Heck in U.S. patent 4,020,560, attached to the bow. Aligning the aiming points of these two devices creates a line-of-sight reference. This line-of-sight reference can be adjusted to different points on the trajectory of the arrow

by moving the aiming point of Slates's, Heck's or Gibbs's device up or down while the aiming point of Chipman's device remains stationary.

A major drawback of adjustable bow devices like Gibbs's, Heck's and Slates's is as the line-of-sight reference is adjusted for the different distances on the trajectory of the arrow, the eye must be repositioned in respect to device **40** in order to maintain proper alignment with the line-of-sight reference, as shown in **FIG. 1** and **FIG.1A**. Repositioning the eye requires the person holding the bow to use a different alignment of the muscles and skeletal structure. A different alignment of the muscles and skeletal structure for each of the distances along the trajectory of the arrow decreases the person's ability to keep the line-of-sight reference aligned to the target object and decreased the person's ability to execute the launch of the arrow in a consistent manner. The arrow must be launched in a manner that causes the arrow's trajectory to be consistent with the trajectory for which the line-of-sight reference was created.

Another major drawback in using devices like Gibbs's, Heck's and Slates's is that, lowering the aiming point too far will cause it to interfere with the launch of the arrow and deflect the trajectory of the arrow from the trajectory that the line-of-sight reference is aligned to. Also when the aiming points of devices like Gibbs's, Heck's and Slates's are lowered past the point of interference with the arrow launch, the aiming points are obscured by the frame of the bow and the hand of the person holding the bow and can not be used to create a line-of-sight reference. Thus, the line-of-sight reference

can not be aligned to distances that require the aiming points of devices like Gibbs's, Heck's and Slates's to be lowered until they interfere with the launch and trajectory of the arrow or are obscured by the bow or the hand of the person holding the bow.

A telescopic sight is a popular line-of-sight reference use to aim firearms and crossbows. The telescopic sight is attached to the firearm or crossbow, in such a manner that the optics of the telescopic sight can be aligned to the two-dimensional plane of the trajectory of the projectile and aligned to a distance along the trajectory of the projectile. Normally, telescopic sights are made with provisions for making internal adjustment to the optics. These internal adjustments are used to align the optical line-of-sight reference to one distance on the trajectory of the projectile, as shown in Tomita's U.S. patent 5,615,487.

Drawbacks of the internal adjustments are; they are inconvenient to use in the field and difficult to calibrate for different distances on the trajectory of the projectile. These drawbacks are addressed in Barnett's U.S. patent 6,073,351, Wilhide's U.S. patent 6,660,289, Bass's U.S. patent 4,317,304 and Hicks's U.S. patent 4,038,757.

A drawback of Barnett's, Wilhide's and Bass's devices is the need to change eye position when the line-of-sight reference is adjusted to different points on the projectile's trajectory. Hick's device makes the internal adjustments of the telescopic sight more accessible but still difficult to calibrate for different distances.

Groh's U.S. patent 6,269,581 utilizes a laser range finder, an electronic coprocessor, and a second projected crosshair inside a telescopic sight for rifles. The

expense and bulk of this device is a drawback. An additional drawback of Groh's device is that the range is limited to the field-of-view of the telescopic sight.

Wedge prisms are similar to lens, but are designed to bend light. The angle-of-deflection is the amount a wedge prism bends light. Wedge prisms are made with a single angle-of-deflection. In my invention two wedge prisms are mounted on a common axis of rotation and in parallel planes, the angle-of-deflection of light through the two wedge prisms becomes variable as the wedge prisms are rotated.

Laser beams can be aimed by using this variable angle-of-deflection arrangement of two wedge prisms as shown in the 2002 "Optics and Optical Instruments Catalog " distributed by "Edmund Industrial Optics". Bramley's U.S. patent 4,878,752, Wallace's U.S. patent 6,295,170, and Isbell's U.S. patent 6,172,821 uses a variable angle-of-deflection arrangement of two wedge prisms to align images in sighting devices, but not for changing the line-of-sight reference with respect to a distance on the trajectory of a projectile.

## SUMMARY OF THE INVENTION

A device for aiming a projectile launcher includes first and second light bending devices which are concentrically aligned. The light bending devices can be rotated counter to one another and the rotation is synchronized such that a line of sight of a viewer looking horizontally through the aiming device moves substantially along a straight line as the light bending devices are rotated. The aiming device is calibrated to indicate the amount of rotation necessary to cause the line of sight to pass through the point where a projectile launched by the projectile launcher will be when it reaches a particular distance.

The foregoing and other objectives, features, and advantages of the invention will be more readily understood upon consideration of the following detailed description of the invention, taken in conjunction with the accompanying drawings.

## DESCRIPTIONS OF THE DRAWINGS

**FIGs. 1 and 1A** show prior art aiming devices used on an archery bow.

**FIGs. 2, 2A and 2B** show how light is deflected through aligned light bending elements as the elements are synchronously counter-rotated.

**FIG. 3** is a perspective view of an aiming device embodying a first embodiment of my invention.

**FIG. 4** is a perspective view of the aiming device of FIG. 3 adapted for use on an archery bow.

**FIG. 5** is a perspective view of the aiming device of FIG. 3 adapted for use with a telescopic sight.

**FIG. 6** is a distal end elevation view of the aiming device of FIG. 3

**FIG. 6A** is in a sectional view taken along the line 6A-6A of FIG. 6.

**FIG. 6B** is in a sectional view taken along the line 6B-6B of FIG. 6, showing the components of the rotational drive system.

**FIG. 7** is a side elevation view of the aiming device of FIG. 3 partially broken away to show hidden detail.

**FIG. 7A** is an enlarged view of the broken away portion of **FIG. 7** showing the attachment and placement of the cables used in the first embodiment of the invention.

**FIG. 8** is a distal end elevation view of the aiming device of **FIG. 3** with components removed to show the position of engaged rotational drive components.

**FIG. 8A** is a sectional view taken along the line 8A-8A of FIG. 8, showing the position of engaged rotational drive components.

**FIG. 9** is a distal end elevation view, similar to FIG. 8 but at a different rotation to show the position of disengaged rotational drive components.

**FIG. 9A** is a sectional view taken along the line 9A-9A of **FIG. 9**.

**FIG. 10** is a distal end elevation view of an aiming device embodying a second embodiment of the subject invention.

**FIG. 10A** is a sectional view taken along the line 10A-10A of FIG. 10.

**FIG. 11** is a perspective view of an aiming device embodying a third embodiment of the subject invention adapted for mounting on an archery bow.

**FIG. 12** is a proximal end elevation view of an aiming device of FIG. 11 showing the linkage in a position that would cause a maximum amount of deflection of the line of sight through the wedge prisms and the means of fastening the two major sections together.

**FIG. 13** is a perspective view of the aiming device of **FIG. 11** showing the slots through which the linkage is connected to the wedge prisms and the linkage position such that the amount of deflection of the line of sight though the wedge prisms would be zero.

## DETAILED DESCRIPTION OF THE INVENTION

When two wedge prisms of equal angles of deflection are aligned with their thickest portions facing vertically upward, a viewer looking through them along a horizontal sight line 53 sees objects that lie along an upwardly projecting line, as shown in FIG. 2. This provides the maximum upward deflection of the viewer's sight line. When the proximal wedge prism 1 is rotated ninety degrees clockwise and the distal wedge prism **2** is rotated ninety degrees counterclockwise, the angle of deflection of the viewer's sight line when looking through the wedge prisms is zero, as shown in **FIG. 2A**. When the proximal wedge prism **1** is rotated clockwise an additional ninety

degrees, equaling a total of 180 degrees of rotation, and the distal wedge prism **2** is rotated an additional ninety degrees counter clockwise, also equaling a total of 180 degrees of rotation, the angle of deflection of the viewer's sight line when looking through the wedge prisms again becomes maximum, but in the opposite direction of the alignment, as shown in **FIG. 2B.**

Two wedge prisms with the same angle of deflection are located in an aiming device which allows the wedges to be rotated in a synchronized opposite manner such that a line of sight through the wedges moves along a straight line as the wedges are rotated. The amount of rotation is referenced to distances along the trajectory of the projectile, and the aiming device is calibrated to show the particular amount of rotation that corresponds to a particular distance.

The subject invention provides a means to align the straight-line movement of the image produced by the synchronized-opposite-rotation of the wedge prisms with the up and down trajectory of the projectile. The aiming points that are used to create the line-of-sight reference are aligned left and right as needed by conventional means already in existence.

Referring to FIGS. 3-9, 6A, 6B, 7A, 8A and 9A, an aiming device includes a shell which is made up of a base **3** and a housing **4** to which all the other components are added. The base **3** and housing **4** are made of metal.

The outside configuration of base **3** needs to take into account the manner in which the aiming device is going to be mounted to a projectile launcher, such as an

archery bow. Examples of some outside configurations are shown in **FIG. 4** and **FIG. 5** where a post **34** was added to the outside configuration of base **3** in **FIG. 4** and a threaded portion **37** was added to the outside configuration of base **3** in **FIG. 5.**

The proximal end of base **3** has a viewing port **51** of a size as shown in **FIG. 3**, that allows for viewing the image that passes through a distal prism **2** and a proximal prism **1**. The distal end of base **3** has a counterbored hole **52** that is aligned with the viewing port **51**. Counterbored hole **52** has a diameter that allows for a slip fit with the outside diameter of proximal ring **6.** Counterbored hole **52** has a depth that allows for a slip fit with the proximal ring **6** when the housing **4**, distal ring **5**, proximal ring **6** and base **3** are assembled into a single unit. The counterbored hole **52** is cut-away on one side to provide for a micro adjusting screw **10**.

A metal Micro adjusting screw **10** is attached to a pivot **11** by inserting a smooth portion of the micro adjusting screw **10** that has a diameter smaller than the micro screw ridges **48** through a hole in pivot **11** and is held in place by a metal retaining screw **13**. The head of retaining screw **13** has a larger diameter than that portion of the micro adjusting screw **10** that is inserted into a hole in pivot **11**. Retaining screw **13** is threaded into a drilled and tapped hole in the end of micro adjusting screw **10** and is tightened against the end of micro adjusting screw **11**. An access hole (not shown) must be made in the base **3** to install retaining screw **13**.

Pivot **11** is made of a plastic material that provides a tight but rotatable fit around the smooth portion of the micro adjusting screw **10** that is inserted into a hole in

the pivot **11**. Pivot **11** also provides for a tight but rotatable fit between the head of retaining screw **13** and the flange created on the micro adjusting screw **10** by having a diameter smaller than the micro screw ridges **48**. Pivot **11** provides a diameter that is inserted into a hole in base 3 and is at a right angle to the micro adjusting screw **10**. The diameter portion of pivot **11** is inserted into a hole in base 3 and is of a size that provides a tight but rotatable fit with the hole in base **3**. The depth of the hole in base **3**, the length of the diameter portion of pivot **11** and the portion of pivot **11** that the micro adjusting screw **10** is inserted into is configured such that pivot **11** does not extend above the surface that the housing **4** is mounted to. The hole in pivot **11** that connects with micro adjusting screw **10** is located in a location that causes the micro screw ridges **48** of micro adjusting screw **10** to be in the same plane as the proximal ring ridges **43** of proximal ring **6**.

The micro adjusting screw **10** extends from the pivot **11** through a slot in base **3** that allows the micro adjusting screw **10** to move in an arc with pivot **11** as the center of that arc. The arc that the slot in base **3** allows is enough to cause the micro screw ridges **48** of micro adjusting screw **10** to engage and disengage with the proximal ring ridges **43** of proximal ring **6.**

The micro screw ridges **48** of micro adjusting screw **10** uniformly spiral along a portion of the length of micro adjusting screw **10** while maintaining a consistent diameter, just like the threads on a standard screw. The proximal ring ridges **43** that are part of the outside surface of proximal ring **6** are configured such that when the micro

screw ridges **48** are engaged with the proximal ring ridges **43** that the proximal ring **6** will not rotate about the line-of-sight axis **53** until the micro adjusting screw **10** is disengaged or rotated about its longitudinal axis.

Micro adjusting screw **10** is held in the position engaged by a specially configured spring **21**. Spring **21** is made of metal spring wire and is shaped to apply pressure to the divots **23** that are equally spaced about the diameter of micro adjusting screw **10**. Spring **21** is shaped so that it can be attached to base **3** by metal screw **22** threading into a drilled and tapped hole in base **3**. Clearance for the placement and subsequent operational movement of spring **21** must be provided in base **3.**

Spring **21** is configured such that when micro adjusting screw **10** is in the engaged position as shown in **FIG. 8** and **FIG.8A**, that spring **21** is in a relationship to divots **23** that causes the micro adjusting screw **10** to resist becoming disengaged and to resist rotating about the longitudinal axis. Spring **21** is also configured so that when the micro adjusting screw **10** is in the disengaged position as shown in **FIG. 9** and **FIG. 9A**, that the micro adjusting screw **10** resists moving to the engaged position.

When micro adjusting screw **10** is in the engaged position, the configuration of the micro screw ridges **48** and the proximal ring ridges **43** is such that the metal proximal ring **6** can not rotate unless micro adjusting screw **10** is rotated about its longitudinal axis. When in the engaged position and the micro adjusting screw **10** is rotated the micro screw ridges **48** exert a pressure on the proximal ring ridges **43** that causes the proximal ring **6** to rotate about the line of sight axis **53**. Because of the

linkage between the proximal ring **6** and the distal ring **5**, when the proximal ring **6** rotates about the line of sight axis **53**, the distal ring **5** also rotates about the line of sight axis **53** but in the opposite direction. Because the micro screw ridges **48** are likened to a worm gear and the proximal ring ridges are likened to a ring gear, rotation of the micro adjusting screw **10** will cause controlled small changes in the relationship between the proximal ring **6** and metal distal ring **5**. These controlled small changes are used to make small adjustments to the distance settings.

The metal knob **12** is attached by conventional means to the end of the micro adjusting screw. Knob **12** provides the advantage required to overcome the resistance to rotation that is caused by spring **21** and the divots **23** so the micro adjusting screw **10** can be turned by hand. Knob **12** also provides the advantage required to overcome the resistance to becoming disengaged that is caused by the configuration of spring **21** and the divots **23**.

The divots **23** are equally spaced about the diameter of the micro adjusting screw **10** and provide a means to control the rotation of the micro adjusting screw **10** in incremental steps. The divots **23** also help the spring **21** to hold the micro adjusting screw **10** in the engaged and disengaged position as shown in **FIG. 8A** and **FIG. 9A** respectfully.

A portion of the housing **4** is configured to have a diameter **54** that is a slip fit into the counterbored hole **52** of base **3**. The housing **4** has limited rotation about the

line of sight axis **53** when the housing **4** is mounted to the base **3** and the proximal ring **6** and the distal ring **5** will continue to rotate freely.

A threaded mounting hole **50** is provided in base **3** to accept the metal axis alignment screw **14**. The axis alignment screw **14** attaches the housing **4** to the base **3** through a metal washer **15** and axis-adjusting slot **32**.

To align the straight up and down movement of the image seen through the proximal prism **1** and distal prism **2** with the up and down plane of the projectile's trajectory the axis alignment screw **14** is loosened and the axis adjusting slot **32** allows the housing **4** to be rotated a limited amount with respect to the base **3**. When the straight up and down movement of the image is aligned, the axis alignment screw **14** is tightened to hold the housing **4** aligned to the base **3**.

A portion of the outside of housing **4** has a diameter that is a slip fit with the inside diameter of metal adjusting ring **7**. That diameter is concentric with the diameter of the distal ring **5** and overlaps a portion of the distal ring **5** on the outside of housing **4**. A distance-adjusting slot **33** is cut though that diameter to provide clearance for metal spacer **18**. A metal adjusting ring screw **16** attaches the metal indicia pointer **9**, the adjusting ring **7** and spacer **18** to the distal ring **5** through distance adjusting slot **33** and threads into distal ring attachment hole **49**. When micro adjusting screw **10** is disengaged, the adjusting ring **7** can be rotated manually about the line of sight axis **53** causing distal ring **5** to also rotated about the line of sight axis **53** the same amount.

Distance adjusting slot **33** is long enough to allow the adjusting ring **7** to ring rotate the distal ring **5** one hundred eighty degrees about the line of sight axis.

Metal indicia ring **8** has an inside and an outside diameter that is cut though at one point. Additional material is left on the outside diameter of indicia ring **8** at the cut point to provide for a drilled and tapped hole on one side of the cut in line with a clearance hole on the other side of the cut. The metal indicia screw **17** is inserted through the clearance hole and threaded into the drilled and tapped hole. The housing **4** provides a length of diameter for the inside diameter and length of the indicia ring **8**. When indicia screw **17** is loosened, the indicia ring **8** can then be rotated on the housing **4** about the line of sight axis **53**. When indicia screw is tightened the indicia ring **8** can no longer be move with respect to the housing **4**. The outside diameter of the indicia ring **8** is of a size that allows for the addition of a removable writing surface and still provides clearance for the indicia pointer **9**. The indicia ring **8** is used for recording and aligning customized distance indicia **45** with the indicia pointer **9**. Indicia pointer **9** points at zero on the reference indicia **44** when the adjusting ring **7** is turned as far counterclockwise as the distance adjusting slot **33** will allow. Reference indicia **44** are even spaced marks on the housing **4** that can be referenced by the indicia pointer **9** as the adjusting ring **7** rotates the distal ring **5** the one hundred eighty degrees of rotation allowed by distance adjusting slot **33**.

The proximal ring **6** and distal ring **5** have an inside diameter that is concentric to the outside diameter but is smaller than the diameters of the proximal

prism **1** and the distal prism **2**, respectfully. That inside diameter is concentrically counterbored to a diameter that is a slip-fit with the diameters of the proximal prism **1** and distal prism **2**, respectfully. The counterbored portions of proximal ring **6** and the distal ring **5** are configured to leave a thin portion of the original inside diameter on the distal end of the proximal ring **6** and on the proximal end of the distal ring **5**. This provides a surface that captures and aligns one side of the proximal prism **1** and distal prism **2**.

The glass proximal prism **1** and the glass distal prism **2** are mounted in proximal ring **6** and distal ring **5** respectfully, using a proximal prism glue bead **19** and a distal prism glue bead **20** respectfully. Proximal prism glue bead **19** and distal prism glue bead **20** are made with epoxy type glue after proximal prism **1** and distal prism **2** are oriented in proximal ring **6** and distal ring **5** respectfully, so that when the indicia pointer **9** is pointing at zero on the reference indicia **44**, the maximum angle of deflection of the line of sight through proximal prism **1** and distal prism **2** is straight up.

The distal end of housing **4** is has a viewing port **55** that allows the image to enter the distal prism **2**. The proximal end of the housing **4** is counterbored to a diameter that is a slip fit with the diameter of distal ring **5** and a portion of the diameter of the proximal ring **6** and to a depth that provides for a slip fit with the distal ring **5** when the housing **4**, distal ring **5**, proximal ring **6** and base **3** are assembled into a single unit.

A portion of the proximal end of housing **4** and the counterbored hole is cut-away on one side to provide clearance for distal cable **24**, proximal cable **25**, distal pulley **28** and proximal pulley **29**.

The distal cable **24** and proximal cable **25** are made of a very flexible low-stretch synthetic fiber and the distal pulley **28** and proximal pulley **29** are made of a plastic that works well as a bearing material on the metal distal pulley pin **30** and the metal proximal pulley pin **31**.

Distal pulley **28** and proximal pulley **29** have holes through the center point of their diameters that are a slip fit with the distal pulley pin **30** and proximal pulley pin **29** respectively, and a concentric groove in their diameters that accommodates the distal cable **24** and the proximal cable **25** respectively. Holes are drilled into housing **4** that are a press fit on the distal pulley pin **30** and the proximal pulley pin **31** and perpendicular to the distal cable **24** and proximal cable **25** respectively. The distal pulley pin **30** and proximal pulley pin **31** are pressed into the press fit holes in the housing **4** through the center of distal pulley **28** and proximal pulley **29** respectively, and into a continuation of the press fit holes in housing **4**. This causes the distal pulley pin **30** and proximal pulley pin **31** to be supported at each end and to be axles for distal pulley **28** and proximal pulley **29** respectively. Distal pulley **28** and proximal pulley **29** have diameters with grooves that align the distal cable **24** and the proximal cable **25** with grooves in the distal ring **5** and proximal ring **6**.

The two grooves cut into distal ring **5** and the two grooves cut into proximal ring **6** accommodate the diameters of the distal cable **24** and proximal cable **25** such that the distal cable **24** and proximal cable **25** do not interfere with the slip fit rotation of the distal ring **5** and proximal ring **6** within the base **3** and housing **4**. The grooves cut into distal ring **5** and proximal ring **6** are concentric with the diameters of distal ring **5** and proximal ring **6** and have equal diameters with respect to the line of sight axis **53**. The grooves cut into distal ring **5** and proximal ring **6** are spaced apart from each other such that the grooves used for the distal cable **24** align with the grooves cut into the diameter of distal pulley **28** and that the grooves used for the proximal cable **25** align with the grooves cut into the diameter of proximal pulley **29**. The distal pulley **28** and the proximal pulley **29** are positioned in the housing **4** such that their relationship with the distal ring **5** and the proximal ring **6** causes the distal cable **24** and the proximal cable **25** to be in the same plane when the cables leave, go around distal pulley **28** and proximal pulley **29** respectfully and return to the distal ring **5** and the proximal ring **6**.

A distal ring cutout **46** in distal ring **5** provides clearance for a securely knotted end of distal cable **24** and a securely knotted end of proximal cable **25** around distal pin **26**. The ends of the metal distal pin **26** and metal proximal pin **27** are secured in holes drilled in distal ring **5** and proximal ring **6** respectfully. Distal cable **24** wraps clockwise around distal ring **5** in the groove cut into the diameter of distal ring **5** that aligns with the groove in the diameter of the distal pulley **28**. Proximal cable **25** wraps

counterclockwise around distal ring **5** in the groove cut into the diameter of distal ring **5** that aligns with the groove in the diameter of the proximal pulley **29**.

Where the clearance is provided in housing **4**, the distal cable **24** exits the groove in the diameter of distal ring **5** and goes around distal pulley **28** in the groove on the diameter of distal pulley **28**. The distal cable **24** then enters the groove in the diameter of the proximal ring **6** that aligns with the groove in the diameter of distal pulley **28** that causes the portions of distal cable **24** between the distal pulley **28** and the distal ring **5** and proximal ring **6** to be parallel to each other. The distal cable **24** then wraps counterclockwise around proximal ring **6** and terminates in a secure knot around proximal pin **27** in the clearance provided in proximal ring **6** by the proximal ring cutout **47**.

Where the clearance is provided in housing **4**, the proximal cable **25** exits the groove in the diameter of the proximal ring **6** and goes around the proximal pulley **27** in the groove on the diameter of the distal pulley **27**. The proximal cable **25** then enters the groove in the diameter of the proximal ring **6** that aligns with the groove in the diameter of the proximal pulley **27** that causes the portions of the proximal cable **25** between the proximal pulley **27** and the distal ring **5** and proximal ring **6** to be parallel to each other. The proximal cable **25** then wraps clockwise around proximal ring **6** and terminates in a secure knot around proximal pin **27** in the clearance provided in proximal ring **6** by the proximal ring cutout **47**.

The lengths of the distal cable **24** and proximal cable **25** are approximately equal and such that there is no slack in either one. The distal cable **24** and proximal cable **25** have ends that have been melted to form a hard ball on each individual end that is larger than the diameter of the cable that keeps the ends of the cables from pulling through the knots on the distal pin **27** and the proximal pin **27**.

A single cable that is equal to the combined lengths of distal cable 24 and proximal cable 25 can replace the distal cable **24** and proximal cable **25**. The center of a single cable is securely knotted to the distal pin **26** and the two remaining portions are used just like the distal cable **24** and the proximal cable **25** are used after they have been securely knotted to distal pin **26**.

With no slack in the cables, when the distal ring **5** is rotated about the line of sight axis **53** by adjusting ring **7**, the proximal ring **6** will rotate about the line of sight axis **53** in an equal but opposite direction. With no slack in the cables, when the proximal ring **6** is rotated about the line of sight axis **53** by the micro adjusting screw **10**, the distal ring **5** will rotate about the line of sight axis **53** in an equal but opposite direction.

In a second embodiment, shown in FIGs. 8, 8A, 9, 9A, 10 and 10A the shell includes a base **3** and a housing **58** to which all the other components are added. The base **3** and housing **58** are made of metal.

The outside configuration of base **3** needs to take into account the manner in which the aiming device is mounted to a projectile device. Examples of some outside

configurations are shown in **FIG. 4** and **FIG. 5** where a post **34** was added to the outside configuration of base **3** in **FIG. 4** and a threaded portion **37** was add to the outside configuration of base **3** in **FIG. 5.**

The proximal end of base **3** has a viewing port **51** of a size as shown in **FIG. 3**, that allows for viewing the image that passes through the glass distal prism **2** and glass proximal prism **1**. The distal end of base **3** has a counterbored hole **52** that is aligned and concentric with the viewing port **51**. Counterbored hole **52** has a diameter that allows for a slip fit with the outside diameter of metal proximal ring **41**. Counterbored hole **52** has a depth that allows for a slip fit with the proximal ring **41** when the housing **58**, metal distal ring **42**, proximal ring **41** and base **3** are assembled into a single unit. The counterbored hole **52** is cut-away on one side to provide for a micro adjusting screw **10**.

A metal Micro adjusting screw **10** is attached to a pivot **11** by inserting a smooth portion of the micro adjusting screw **10** that has a diameter smaller than the micro screw ridges **48** through a hole in pivot **11** and is held in place by a metal retaining screw **13**. The head of retaining screw **13** has a larger diameter than that portion of the micro adjusting screw **10** that is inserted into a hole in pivot **11**. Retaining screw **13** is threaded into a drilled and tapped hole in the end of micro adjusting screw **10** and is tightened against the end of micro adjusting screw **11**. An access hole (not shown) must be made in the base **3** to install metal retaining screw **13**.

Pivot **11** is made of a plastic material that provides a tight but rotatable fit around the smooth portion of the micro adjusting screw **10** that is inserted into a hole in the pivot **11**. Pivot **11** also provides for a tight but rotatable fit between the head of retaining screw **13** and the flange created on the micro adjusting screw **10** by having a diameter smaller than the micro screw ridges **48**. Pivot **11** provides a diameter that is inserted into a hole in base **3** and is at a right angle to the micro adjusting screw **10**. The diameter portion of pivot **11** is inserted into a hole in base 3 and is of a size that provides a tight but rotatable fit with the hole in base **3**. The depth of the hole in base **3**, the length of the diameter portion of pivot **11** and the portion of pivot **11** that the micro adjusting screw **10** is inserted into is configured such that pivot **11** does not extend above the surface that the housing **58** is mounted to. The hole in pivot **11** that connects with micro adjusting screw **10** is located in a location that causes the micro screw ridges **48** of micro adjusting screw **10** to be in the same plane as the proximal ring ridges **43** of proximal ring **6**.

The micro adjusting screw **10** extends from the pivot **11** through a slot in base **3** that allows the micro adjusting screw **10** to move in an arc with pivot **11** as the center of that arc. The arc that the slot in base **3** allows is enough to cause the micro screw ridges **48** of micro adjusting screw **10** to engage and disengage with the proximal ring ridges **43** of proximal ring **41**.

The micro screw ridges **48** of micro adjusting screw **10** uniformly spiral along a portion of the length of micro adjusting screw **10** while maintaining a consistent

diameter, just like the threads on a standard screw. The proximal ring ridges **43** that are part of the outside surface of proximal ring **41** are configured such that when the micro screw ridges **48** are engaged with the proximal ring ridges **43** that the proximal ring **41** will not rotate about the line-of-sight axis **53** until the micro adjusting screw **10** is disengaged or rotated about its longitudinal axis.

Micro adjusting screw **10** is held in the position engaged by a specially configured spring **21**. Spring **21** is made of metal spring wire and is shaped to apply pressure to the divots **23** that are equally spaced about the diameter of micro adjusting screw **10**. Spring **21** is shaped so that it can be attached to base **3** by metal screw **22** threading into a drilled and tapped hole in base **3**. Clearance for the placement and subsequent operational movement of spring **21** must be provided in base **3.**

Spring **21** is configured such that when micro adjusting screw **10** is in the engaged position as shown in **FIG. 8** and **FIG.8A**, that spring **21** is in a relationship to divots **23** that causes the micro adjusting screw **10** to resist becoming disengaged and to resist rotating about the longitudinal axis. Spring **21** is also configured so that when the micro adjusting screw **10** is in the disengaged position as shown in **FIG. 9** and **FIG. 9A**, that the micro adjusting screw **10** resists moving to the engaged position.

When micro adjusting screw **10** is in the engaged position, the configuration of the micro screw ridges **48** and the proximal ring ridges **43** is such that the metal proximal ring **41** can not rotate unless micro adjusting screw **10** is rotated about its longitudinal axis. When in the engaged position and the micro adjusting screw

**10** is rotated the micro screw ridges **48** exert a pressure on the proximal ring ridges **43** that causes the proximal ring **41** to rotate about the line of sight axis **53**. Because of the linkage between the proximal ring **41** and the distal ring **42**, when the proximal ring **41** rotates about the line of sight axis **53**, the distal ring **42** also rotates about the line of sight axis **53** but in the opposite direction. Because the micro screw ridges **48** are likened to a worm gear and the proximal ring ridges are likened to a ring gear, rotation of the micro adjusting screw **10** will cause controlled small changes in the relationship between the proximal ring **41** and distal ring **42**. These controlled small changes are used to make small adjustments to the distance settings.

The metal knob **12** is attached by conventional means to the end of the micro adjusting screw. Knob **12** provides the advantage required to overcome the resistance to rotation that is caused by spring **21** and the divots **23** so the micro adjusting screw **10** can be turned by hand. Knob **12** also provides the advantage required to overcome the resistance to becoming disengaged that is caused by the configuration of spring **21** and the divots **23**.

The divots **23** are equally spaced about the diameter of the micro adjusting screw **10** and provide a means to control the rotation of the micro adjusting screw **10** in incremental steps. The divots **23** help the spring **21** to hold the micro adjusting screw **10** in the engaged and disengaged position as shown in **FIG. 8A** and **FIG. 9A** respectfully.

A portion of the housing **58** is configured to have a diameter **54** that is a slip fit into the counterbored hole **52** of base **3**. The housing **58** has limited rotation

about the line of sight axis **53** when the housing **58** is mounted to the base **3** and the proximal ring **41** and the distal ring **42** will continue to rotate freely.

A threaded mounting hole **50** is provided in base **3** to accept the metal axis alignment screw **14**. The axis alignment screw **14** attaches the housing **58** to the base **3** through a metal washer **15** and axis-adjusting slot **32**.

To align the straight up and down movement of the image seen through the proximal prism **1** and distal prism **2** with the up and down plane of the projectile's trajectory the axis alignment screw **14** is loosened and the axis adjusting slot **32** allows the housing **58** to be rotated a limited amount with respect to the base **3**. When the straight up and down movement of the image is aligned, the axis alignment screw **14** is tightened to hold the housing **58** aligned to the base **3**.

A portion of the outside of housing **58** has a diameter that is a slip fit with the inside diameter of metal adjusting ring **7**. That diameter is concentric with the diameter of the distal ring **42** and overlaps a portion of the distal ring **42** on the outside of housing **58**. A distance-adjusting slot **33** is cut though that diameter to provide clearance for metal spacer **18**. A metal adjusting ring screw **16** attaches the metal indicia pointer **9**, the adjusting ring **7** and spacer **18** to the distal ring **42** through distance adjusting slot **33** and threads into distal ring attachment hole **49**. When micro adjusting screw **10** is disengaged, the adjusting ring **7** can be rotated manually about the line of sight axis **53** causing distal ring **42** to also rotated about the line of sight axis **53** the

same amount. Distance adjusting slot **33** is long enough to allow the adjusting ring **7** to ring rotate the distal ring **42** one hundred eighty degrees about the line of sight axis.

Metal indicia ring **8** has an inside and an outside diameter that is cut though at one point. Additional material is left on the outside diameter of indicia ring **8** at the cut point to provide for a drilled and tapped hole on one side of the cut in line with a clearance hole on the other side of the cut. The metal indicia screw **17** is inserted through the clearance hole and threaded into the drilled and tapped hole. The housing **58** provides a length of diameter for the inside diameter and length of the indicia ring **8**. When indicia screw **17** is loosened, the indicia ring **8** can then be rotated on the housing **58** about the line of sight axis **53**. When indicia screw is tightened the indicia ring **8** can no longer be move with respect to the housing **58**. The outside diameter of the indicia ring **8** is of a size that allows for the addition of a removable writing surface and still provides clearance for the indicia pointer **9**. The indicia ring **8** is used for recording and aligning customized distance indicia **45** with the indicia pointer **9**. Indicia pointer **9** points at zero on the reference indicia **44** when the adjusting ring **7** is turned as far counterclockwise as the distance adjusting slot **33** will allow. Reference indicia **44** are even spaced marks on the housing **58** that can be referenced by the indicia pointer **9** as the adjusting ring **7** rotates the distal ring **42** the one hundred eighty degrees of rotation allowed by distance adjusting slot **33**.

The proximal ring **41** and distal ring **42** have an inside diameter that is concentric to the outside diameter but is smaller than the diameters of the proximal

prism **1** and the distal prism **2**, respectfully. That inside diameter is concentrically counterbored to a diameter that is a slip-fit with the diameters of the proximal prism **1** and distal prism **2**, respectfully. The counterbored portions of proximal ring **41** and the distal ring **42** are configured to leave a thin portion of the original inside diameter on the distal end of the proximal ring **41** and on the proximal end of the distal ring **42**. This provides a surface that captures and aligns one side of the proximal prism **1** and distal prism **2**.

The glass proximal prism **1** and the glass distal prism **2** are mounted in proximal ring **41** and distal ring **42** respectfully, using a proximal prism glue bead **19** and a distal prism glue bead **20** respectfully. Proximal prism glue bead **19** and distal prism glue bead **20** are made with epoxy type glue after proximal prism **1** and distal prism **2** are oriented in proximal ring **41** and distal ring **42** respectfully, so that when the indicia pointer **9** is pointing at zero on the reference indicia **44**, the maximum angle of deflection of the line of sight through proximal prism **1** and distal prism **2** is straight up.

The distal end of housing **58** is has a viewing port **55** that allows the image to enter the distal prism **2**. The proximal end of the housing **58** is counterbored to a diameter that is a slip fit with the diameter of distal ring **42** and a portion of the diameter of the proximal ring **41** and to a depth that provides for a slip fit with the distal ring **42** when the housing **58**, distal ring **42**, proximal ring **41** and base **3** are assembled into a single unit.

Press fit holes have been drilled thought the housing **58** to accommodate the metal gear pins **56** that hold the metal gears **57** in place. The gear pins **56** have a diameter that is a slip fit through the gears **57** and a press fit into housing **58**. The gear pins **56** have a larger diameter that capture the gears **57** against the inside diameter of housing **58** such that the gears **57** can rotate freely.

The gears **57** have an equal amount of evenly spaced gear-like ridges that are parallel to the length of the central hole that the gear pins **56** go through and the ridges are concentric to the diameter of the central hole. The ridges on the gears **57** are configured to align with and be a smooth rolling fit with ridges in the proximal end of the distal ring **42** and with the ridges in the distal end of proximal ring **41**.

With only one of the gears **57** secured in place by one of the gear pins **56** the rotation of the proximal ring **41** becomes linked to the distal ring **42** such that when either the proximal ring **41** or the distal ring **42** is rotated about the line of sight axis **53**, the adjoining ring will rotate in the opposite direction about the line of sight axis **53**. More than one of the gears **57** is used to keep the rotational movements of proximal ring **41** and distal ring **42** smooth and parallel.

All the gears **57** have the same number of ridges. The number of ridges on the proximal end of the distal ring **42** equals the number of ridges on the distal end of proximal ring **41**.

Slack in the linkage between distal ring **42** and proximal ring **41** is minimized by using more than one of the gears **57**. The gears **57** should be positioned

such that the timing of the engagement of the ridges of the gears **57** to the ridges of the proximal ring **41** and the ridges of the distal ring **42** is not the same for each of the gears **57**.

A third embodiment of the invention, shown in FIGs. 11-13, consists of a framework made up of a base **59** and a housing **60** to which all the other components are added. The base **59** and housing **60** are made of metal.

The outside configuration of base **59** needs to take into account the manner in which the aiming device is going to be mounted to a projectile device. The base **59** that is shown in **FIG. 11, 12** and **13** is configured to facilitate the attachment of a mounting bracket **85** for an archery bow. The outside shape could be configured to incorporate a threaded portion similar to the threaded portion **37** that was added to the outside configuration of base **3** in **FIG. 5** to facilitate attachment to a telescopic sight.

The proximal side of base **59** when viewed in the direction of the line of sight **53** as shown in **FIG. 12**, has a viewing port that allows for viewing the image that passes through the glass distal prism **2** and glass proximal prism **1**. The distal side of base **3** has a counterbored hole that is aligned and concentric with the viewing port. The counterbored hole has a diameter that allows for a slip fit with the outside diameter of metal proximal ring **61**. The counterbored hole has a depth that allows for a slip fit with the proximal ring **61** when the housing **60**, metal distal ring **62**, proximal ring **61** and base **59** are assembled into a single unit.

A portion of the counterbored hole is cut-away to allow for the free movement of the protruding portion of the proximal ring **61** that attaches to the metal proximal ring link **63**. The cut-away portion of the counterbored hole of the base **59** starts directly opposite the portion of the base **59** that protrudes away from the counterbored hole as shown in **FIG. 13**. The cut-away portion of the counterbored hole ends at the place where the protruding portion of the base **59** starts to protrude.

The portion that protrudes away from the counterbored hole of the base **59** is configured to provide press-fit alignment holes for metal alignment pins **86** and holes that are countersunk for metal flat head screws **87**. **FIG. 11** and **13** show that portion of the base **59** configured to act as a rail along which the mounting bracket **85** can be attached.

The distal side of housing **60** when viewed in the direction of the line of sight **53** has a viewing port as shown in **FIG. 11** and **13** that allows for viewing the image that passes through the distal prism **2** and proximal prism **1**. The proximal side of housing **60** has a counterbored hole that is aligned and concentric with the viewing port. The counterbored hole has a diameter that allows for a slip fit with the outside diameter of distal ring **62**. The counterbored hole has a depth that allows for a slip fit with the distal ring **62** when the housing **60**, distal ring **62**, proximal ring **61** and base **59** are assembled into a single unit.

A portion of the counterbored hole is cut-away to allow for the free movement of the protruding portion of the distal ring **62** that attaches to the metal

proximal ring link **66**. The cut-away portion of the counterbored hole of the housing **60** starts directly opposite the portion of the housing **60** that protrudes away from the counterbored hole as shown in **FIG. 13**. The cut-away portion of the counterbored hole stops at the place where the protruding portion of the housing **60** starts to protrude.

The portion that protrudes away from the counterbored hole of the housing **60** is configured on the proximal side to provide slip-fit alignment holes for alignment pins **86** and threaded holes for flat head screws **87**. The alignment holes of the housing **60** and base **59** are configured so that when the distal side of base **59** is mated with the proximal side of housing **60** that the counterbores at the ends of the housing **60** and base **59** are aligned and concentric to each other and the threaded holes in the housing **60** align with the countersunk holes in base **59** when the alignment pins **86** are in place. The flat head screws **87** are used to secure the base **59** to the housing **60** after the alignment pins **86** are in place.

The portion of the housing **60** that protrudes perpendicularly away from the counterbored hole in the proximal side of housing **60** is configured to act as a rail that allows only linear movement of the metal slider **74** and the metal micro slider **81** along the length of the rail. The length of the rail portion of the housing **60** is determined by the amount of rotation of the proximal ring **61** and the distal ring **62** are allowed by the cutout portions of the housing **60** and base **59** to be translated into the straight line movement of slider **74** and the micro slider **81** along the rail. The distal side of that portion of housing **60** has permanent reference indicia **83** that are used to reference

different degrees of orientation of the wedge prisms **1** and **2** for different distances on the trajectory of the projectile. The distal side of that portion of the housing **60** also provides a space for removable writing material so that the shooter can use customized reference indicia **84**.

The proximal ring **61** and the distal ring **62** have an inside diameter that is concentric to the outside diameter but is smaller than the diameters of the proximal prism **1** and the distal prism **2**, respectfully. That inside diameter is concentrically counterbored to a diameter that is a slip-fit with the diameters of the proximal prism **1** and distal prism **2**, respectfully. The counterbored portions of proximal ring **61** and the distal ring **62** are configured to leave a thin portion of the original inside diameter on the distal end of the proximal ring **61** and on the proximal end of the distal ring **62**. This provides a surface that captures and aligns one side of the proximal prism **1** and distal prism **2**.

The glass proximal prism **1** and the glass distal prism **2** are mounted in proximal ring **61** and distal ring 62 respectfully, using a proximal prism glue bead **70** and a distal prism glue bead **69** respectfully. Proximal prism glue bead **70** and distal prism glue bead **69** are made with epoxy type glue after proximal prism **1** and distal prism **2** are oriented in proximal ring **61** and distal ring **62** respectfully, so that when the slider **74** is centered between the two extreme positions possible on the rail of the housing **60** the angle of deflection of the line of sight through proximal prism **1** and distal prism **2** is zero.

The proximal ring **61** and distal ring **62** each have a protrusion that extends outward from and perpendicular to the outside diameter. The protrusion is located and configured to align with the clearances cut in the base **59** and the housing **60**, respectfully. The protrusion on proximal ring **61** has a threaded hole that is used to attach one end of the proximal ring link **63** to the proximal ring **61** using metal shoulder screw **64**. The protrusion on distal ring **62** has a threaded hole that is used to attach one end of the distal ring link **66** to the distal ring **62** using metal shoulder screw **67**.

The distal ring link **66** has a hole in the end that attaches to distal ring **62** that is a slip fit with the smooth diameter portion of shoulder screw **67**. The opposite end of distal ring link **66** has a hole that is a slip fit with the smooth diameter portion of shoulder screw **68** that is used to attach that end to the slider **74**.

The proximal ring link **63** has a hole in the end that attaches to proximal ring **61** that is a slip fit with the smooth diameter portion of shoulder screw **64**. The opposite end of proximal ring link **63** has a thread hole that is used to attach that end to the metal straight-line adjustment piece **71** using metal shoulder screw **65**.

The straight-line adjustment piece **71** has a hole that is a slip fit with the smooth diameter portion of shoulder screw **65**. The straight-line adjustment piece **71**, the proximal ring link **63** and the protrusions on proximal ring **61** are configured so that the proximal ring link **63** is parallel to the rail portion of housing **60**.

The straight-line adjustment piece **71** is keyed to fit into a keyway cut into slider **74**. The metal straight-line clamping screw **73** goes through the metal straight-

line washer **72** and a slot in the straight-line adjustment piece **71** and screws into a threaded hole in the slider **74**. The straight-line adjustment piece **71** and the keyway in the slider **74** are configured such that when the straight-line clamping screw **73** is loosened that the straight-line adjustment piece **71** can be moved a small amount in either direction along the keyway in the slider **74**. Then by securely tightening the straight-line clamping screw **73**, the straight-line adjustment piece **71** is securely held in the new location. This adjustability is used to make any vertical alignment changes needed to for the straight-line movement of the image seen through proximal prism **1** and distal prism **2**.

The distal ring link is attached to slider **74** using shoulder screw **68** and a threaded hole in slider **74**. The slider **74**, the distal ring link **66** and the protrusions on distal ring **62** are configured so that the distal ring link **66** is parallel to the rail portion of housing **60**.

The slider **74** and the micro slider **81** are configured to be captured on the rail portion of housing **60** while providing a slip fit along the rail. The slider **74** and micro slider **81** have threaded holes to accommodate the metal slider locking screw **75** and metal micro slider locking screw **82**, respectfully. The threaded holes extend to slots that are cut into the slider **74** and the micro slider **81**. The slot in the slider **74** is located and configured such that when the slider locking screw **75** is tightened by hand that a portion of slider **74** is forced against the rail causing the slider **74** to be clamped to the rail portion of housing **60** and no longer movable along the length of the rail. The

slot in the micro slider **81** is located and configured such that when the micro slider locking screw **82** is tightened by hand that a portion of micro slider **81** is forced against the rail causing the micro slider **81** to be clamped to the rail portion of housing **60** and no longer movable along the length of the rail.

Slider locking screw **75** and micro slider locking screw **82** have a radius on the end of the screw portion that pushes on the clamping portion of slider **74** and micro slider **81**, respectively. Slider locking screw **75** and micro slider locking screw **82** have knobs securely attached to the threaded portions. The knobs provide the leverage needed to hand tighten the radiused ends of the screw portion against the clamping portions of the slider **74** and micro slider **81**, respectively, tight enough to prevent unwanted movement of slider **74** and micro slider **81** along the rail part of the housing **60**.

A viewing port is cut into slider **74** that permits the reference indicia **83** and the user indicia **84** behind the center portion of the slider **74** to be visible. The viewing port is configured to have a nonadjustable pointer that aligns with the reference indicia **83**. The viewing port in slider **74** also provides clearance for a metal movable pointer **76** to be aligned with the user indicia **84**.

The metal movable pointer locking screw **78** is inserted though the movable pointer washer **77** and a slot in the movable pointer **76** and is screwed into a threaded hole in slider **74**. The slider **74** is configured so that when the movable pointer locking screw **78** is loosened that the movable pointer **76** can be moved a small amount

in either direction along the user indicia **84** and will be securely held in the new location when the movable pointer locking screw **78** is tightened.

The micro slider **81** is movably connected to slider **74** by the metal threaded rod **79**. One end of threaded rod **79** is securely attached to the slider **74** such that the length of the threaded rod **79** extends through two holes in the micro slider **81** and is parallel to the rail portion of housing **60**. The two holes in the micro slider **81** are a slip fit with the diameter of the threaded rod **79** and are separated by a distance that is a slip fit with the length of metal knurled adjustment nut **80**. The knurled adjustment nut **80** has a threaded hole through the center that is concentric with the outside diameter.

The micro slider **81** is configured such that when the micro locking screw **82** is tightened and the slider locking screw **75** is loosened that the knurled adjustment nut **80** can be rotated about the threaded rod **79** causing controlled movement of the slider **74** along the rail portion of the housing **60**.

A fourth embodiment of the invention, which is not shown in the drawings, uses two miniature electric stepper motors that are controlled and synchronized electronically. A separately mounted electronic control would contain the appropriate motor drivers, number keyboard and electronics to provide for the synchronized movement of the motors relating to input from the number keyboard. The electronics would be set up so that a distance could be entered into the keyboard and the motors would cause the wedge prisms **1** and **2** to rotate in the proper direction and the

appropriate amount for that distance. The proper direction and appropriate amount would be the direction and amount that would cause the projectile to be aimed such that the projectile will hit a target at the distance entered into the keyboard.

The electronics would be connected to the motors with the necessary wiring.

The glass wedge prisms **1** and **2** are respectfully mounted in a metal proximal wedge prism ring and a metal distal wedge prism ring using an epoxy glue bead like proximal prism glue bead **19** and distal prism glue bead **20**. The proximal and distal wedge prism rings, each provide compatible matching thread like ridges, similar to the proximal ring ridges **43**. The distal and proximal wedge prism rings have an outside diameter that is a slip fit in a counterbored portion of a metal housing piece and a metal base piece, respectfully. The distal and proximal wedge prism rings have a length that is a slip fit with the depth of the counterbored portions of the housing piece and the base piece such that when the housing piece is fastened to the base piece, the distal and proximal wedge prism rings in the counterbores are captured and are free to rotate with little resistance.

The housing piece and the base piece are configured such that they can be fastened together with a metal clamping screw going through a washer, a slot in the housing and screwed into a threaded hole in the base. The slot in the housing piece is such that when the clamping screw that holds the housing piece to the base piece is loosened the housing piece can be rotated with respect to the base piece within the limits

of that slot. Then by securely tightening the clamping screw the housing piece can be securely held in the new location with respect to the base piece. This adjustability is used to make any vertical alignment changes needed to for the straight-line movement of the image seen through proximal prism **1** and distal prism **2**.

A portion of the housing piece is configured to have a slip fit diameter that fits into the counterbored portion of the base piece similar to the slip fit diameter **54**. The slip fit diameter maintains a concentrically alignment of the section counterbored for the distal wedge prism ring in the housing piece with the section counterbored for the proximal wedge prism ring in the base piece.

A reference slot is cut in the housing piece that is similar the distance adjusting slot **33**. The reference slot is configured to allow a metal pointer like indicia pointer **9** to be attached with a metal screw going through the pointer and appropriate spacers and screwing into a threaded hole in the distal wedge prism. The pointer will then move with the distal wedge prism. The pointer will then move along indicia similar to the reference indicia **44** that are on the outside of the housing piece providing a visual reference that indicates the alignment relationship of the wedge prisms **1** and **2**.

The motors have metal output shafts that has a diameter that is configured to provide screw like ridges, like the micro screw ridges **48**, similar to a worm gear.

The housing piece is configured to facilitate mounting one motor to the housing piece such that the screw like ridges on the shaft of the motor align with and are permanently engaged with the screw like ridges in the distal wedge prism ring.

Clearance is provide in the housing piece for the shaft of the motor along with a means to capture the end of the shaft with a bushing. The bushing is inserted into the housing piece and is made of standard type bushing material. The bushing is immovably attached to the housing piece. The bushing has a hole that allows for the free rotation of the end of the shaft while preventing the deflection of the motor shaft ridges away from the screw like ridges in the distal wedge prism ring.

The base piece is configured to facilitate mounting one motor to the base piece such that the screw like ridges on the shaft of the motor align with and are permanently engaged with the screw like ridges in the proximal wedge prism ring. Clearance is provide in the base piece for the shaft of the motor along with a means to capture the end of the shaft with a bushing. The bushing is inserted into the base piece and is made of standard-type bushing material. The bushing is immovably attached to the base piece. The bushing has a hole that allows for the free rotation of the end of the shaft while preventing the deflection of the motor shaft ridges away from the screw like ridges in the proximal wedge prism ring.

Consideration must be given to how the aiming device is mounted to the projectile launcher when the base piece is configured. The location of the provisions for mounting the motors to the housing piece and the base piece motors must take into account how the aiming device is mounted to the projectile launcher and the overall application of my invention.

The terms and expressions which have been employed in the foregoing specification are used therein as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding equivalents of the features shown and described or portions thereof, it being recognized that the scope of the invention is defined and limited only by the claims which follow.